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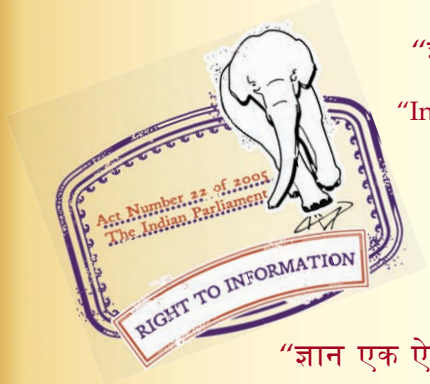

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(पहला पुनरीक्षण)

Indian Standard

METHOD FOR DETERMINATION OF COLOUR FASTNESS OF DISPERSE DYES ON POLYESTER FABRICS TO CARBONIZATION

(First Revision)

UDC 677·016·473·4 : 535·684·34

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

This Indian Standard which was originally published in 1984, specified the use of a control specimen of 100 percent polyester fabric obtained by carbonization of polyester — cellulosic fabric under test. The change in colour of dyed and carbonized test specimens is assessed by the grey scale for change in colour taking the dyed control specimen as the standard. This procedure could not give reproducible and repeatable results as the control specimens are affected by the carbonization treatment during test. This standard is now being revised to specify standard control specimens of 100 percent woven polyester fabric which do not change during test to ensure reproducible and repeatable test results.

Indian Standard

METHOD FOR DETERMINATION OF COLOUR FASTNESS OF DISPERSE DYES ON POLYESTER FABRICS TO CARBONIZATION

(First Revision)

1 SCOPE

1.1 This standard prescribes a method for determination of fastness of disperse dyes on 100 percent polyester fabrics to the action of 70 percent (m/m) sulphuric acid used in carbonization process.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
768 : 1982	Method for evaluating change in colour (*first revision*)
1070 : 1992	Reagent grade water (*third revision*)

3 PRINCIPLE

3.1 A 100 percent polyester fabric is dyed with the disperse dye under test and then a test specimen from this dyed fabric is subjected to the action of sulphuric acid of 70 percent (m/m) concentration. After rinsing and drying, the change in colour of the test specimen is then assessed with the help of geometric grey scale (*see* IS 768 : 1982).

4 SAMPLING OF DISPERSE DYE

4.1 Lot

All the containers of the same colour and strength of disperse dye delivered to a buyer against one despatch note shall constitute a lot.

4.2 Unless otherwise agreed to between the buyer and the seller, the number of containers to be selected at random from a lot shall be as follows:

Lot Size	*Sample Size*
Up to 8	2
9 to 15	3
16 to 25	4
26 and above	5

4.3 When the dye is available in powder form, draw from each container, small quantities of the dye by a suitable sampling instrument from at least three different parts and mix them thoroughly to get a composite sample weighing about 20 g. This shall constitute the test sample.

4.4 For the dyes available in the form of liquid emulsion or paste stir the contents of each container thoroughly and then draw small quantities of the dye by a suitable sampling instrument from at least three different parts of each container and mix them thoroughly to get a composite sample weighing about 20 g. This shall constitute the test sample.

5 PREPARATION OF TEST SPECIMENS FROM 100 PERCENT POLYESTER FABRIC

5.1 Undyed 100 percent spun polyester fabric to be used in the dyeing of disperse dye under test shall have the following general constructional details:

Tex of Yarn		*Ends/ dm*	*Pick/ dm*	*Mass, g/m²*	*Type af Weave*
Warp	*Weft*				
7·5×2	20	235	205	130±5	1/1 Plain

5.2 Prepare at least four test specimens of 10 × 4 cm from 100 percent polyester fabric for each lot of disperse dye to be tested.

6 APPARATUS

6.1 A laboratory scale high temperature bob/ beaker dyeing machine.

6.2 Glass beakers of 500-ml capacity.

6.3 Test tubes.

6.4 Geometric grey scale for change in colour.

7 REAGENTS

7.1 Quality of Reagents

Unless specified otherwise, pure reagents shall be employed in the tests and distilled water (*see* IS 1070 : 1992) shall be used as a reagent.

NOTE — 'Pure reagents' shall mean reagents that do not contain impurities which affect the test results.

7.2 List of Reagents

a) *Sulphuric Acid Solution* — Reagent grade solution of 70 percent (m/m) concentration having specific gravity 1·629 at room temperature and free from any nitrogenous impurities such as nitrous acid and nitric acid.

b) *Sodium Carbonate Solution* — Containing 2 g/litre of anhydrous sodium carbonate.

c) A dispersing agent.

d) *Acetic Acid* — 30 percent (m/v).

e) Sodium hydrosulphite powder.

f) A suitable non-ionic detergent.

g) Urea.

h) Diphenyl amine.

j) Sodium hydroxide flakes.

k) Ammonium hydroxide (8 : 92) solution (Mix 8 parts of ammonium hydroxide having specific gravity 0·90 with 92 parts of water by volume.

m) A suitable wetting agent.

8 PROCEDURE

8.1 Scour all the 100 percent polyester fabric test specimens (*see* **5.2**) according to the procedure given in Annex A (*see* **A-1**).

8.2 Dye all the test specimens as obtained in **8.1** as per the procedure given in Annex A (*see* **A-2**).

NOTE — Instrumental colour matching may also be resorted to if agreed to between the buyer and the seller.

8.3 Mark one dyed test specimen from **8.2** as test control specimen and carry out the operations from **8.4** to **8.5** with remaining three test specimens in three different beakers.

8.4 Immerse the dyed test specimen from **8.3** into a beaker containing 100 ml of 70 percent (m/m) sulphuric acid solution per gram of the specimen at room temperature. Shake the beaker carefully to wet out the specimen completely. Maintain the beaker at room temperature for 30 minutes with intermittent stirring.

NOTE — In case it is felt necessary to simulate the conditions occurring in carbonization process, add 0·3 to 0·5 gram of scoured cotton per gram of the specimen to the beaker containing 70 percent sulphuric acid and then proceed with the treatment for 30 minutes.

8.5 Rinse the test specimen as obtained in **8.4** for 5 minutes in cold running tap water and then neutralize it with ammonium hydroxide solution (8 : 92) for 10 minutes. Rinse the test specimens twice in cold water and finally in cold running tap water for 10 minutes. Dry the test specimen in air at a temperature not exceeding 60°C.

NOTES

1 It has been found that the colour of the fabric dyed with disperse dyes is destroyed, if exposed to an environment, having nitrous acid fumes or chlorine gas. The deteriorating effect is more pronounced if the nitrous acid fumes or chlorine gas are present in the sulphuric acid bath. Therefore, the fabric should not be exposed to this type of environment during the test.

2 The strength of the sulphuric acid should be checked during carbonization to ensure that it does not vary significantly.

3 Sulphuric acid may contain nitrogenous impurities, such as nitrous and nitric acid. These impurities are harmful and even traces cause considerable dulling of shade of dyeings. In order to protect disperse dyes against the action of these unwarranted impurities, urea or sulphamic acid to the extent of 10-20 g/litre may be incorporated in the carbonization bath. The addition of these chemicals prevents the adverse effect of impurities on the dyeing and it also helps in subsiding the effect of temperature rise during carbonization.

4 The presence of oxidizing impurities (such as nitrous, nitric and nitrosyl sulphuric acids) can be detected by the test as given in Annex B.

8.6 Assess the effect of change in colour of the test specimens keeping test control specimen as standard and give all the test specimens appropriate grey scale rating.

NOTE — In case of doubt in the fastness ratings as assessed by an observer, the assessment should be done by at least three observers and the overall average rating should be reported.

9 TEST REPORT

9.1 Report the lowest value of the numerical ratings for change in colour of the test specimens.

ANNEX A

(*Clauses* 8.1 *and* 8.2)

PREPARATION OF DYEING OF DISPERSE DYES

A-1 SCOURING

A-1.1 Treat all the test specimens in a bath at 70-110°C for 15-30 minutes, containing one part wetting agent, 1-2 parts sodium carbonate per 1 000 parts by mass of water keeping liquor ratio 40 : 1.

A-1.2 Rinse all the test specimens in warm water (40-50°C) containing one part of acetic acid (30 percent *m/v*) per 1 000 parts of water by mass and then rinse all the test specimens in plain water.

A-2 DYEING

A-2.1 Wet out all the test specimens in boiling water for 10 minutes and squeeze them evenly to about 100 percent pick up. Cool the test specimens and enter into separate dye baths already prepared at 60°C. Each dye bath shall contain the disperse dye required for the standard depth agreed to between the buyer and the supplier and 0·5 to 1 g/l of dispersing agent. *p*H of the dye bath shall be adjusted between 5·0 to 6·0 with acetic acid (30 percent *m/v*) keeping a liquor ratio of 40 : 1.

NOTE — Dye bath is prepared by first sprinkling the required amount of dyestuff over 15-20 times the quantity of distilled water at 40°C under constant stirring and then adding this to a blank bath containing dispersing agent and acetic acid, *p*H adjusted to 5·0 to 6·0. The dyeing is carried out in high temperature bomb/beaker dyeing machine.

A-2.2 Start dyeing at 60°C and raise the temperature to 130°C at the rate of 2 to 3°C per minute in about 30 minutes. Then continue dyeing at 130°C for 60 minutes. Cool the machine to 85°C, to take out the bombs/beakers and cool them further under tap water before opening. Take out all the test specimens.

A-2.3 Rinse all the dyed specimens in cold water and give the subsequent treatments as given in **A-2.4** and **A-2.5**.

A-2.4 Reduction Clearing

Treat all the specimens obtained in **A-2.3** in separate baths each containing 2 g/l caustic soda flakes and 2 g/l sodium hydrosulphite at 70°C for 30 minutes keeping a material to liquor ratio of 40 : 1. Rinse all the specimens in cold water.

A-2.5 Soaping

Soap all the specimens obtained in **A-2.4** at 70-80°C for 20 minutes at a liquor ratio of 40 : 1 in separate baths, each containing 1 g/l of wetting agent. Wash the specimens in cold running water and dry them by hanging at a temperature not exceeding 60°C.

ANNEX B

(*Note* 4 *under Clause* 8.5)

METHOD FOR TESTING PRESENCE OF OXIDIZING IMPURITIES IN SULPHURIC ACID

B-1 Prepare 1 percent (*m/v*) diphenylamine solution in glycol.

B-1.1 Take 2 ml of sulphuric acid solution in a test tube and add to it 3 to 4 drops of 1 percent diphenyl amine solution. A blue colour will indicate the presence of oxidizing impurities.

B-2 In other test tube take 4-5 ml of the sulphuric acid solution. Add to it a few milligrams of urea and mix the two. Then add 2-3 drops of 1 percent diphenylamine solution. A faint yellowish green colour indicates that the impurities are suppressed/nullified by the urea added in the acid.

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